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PCT

Attorney Docket No.: C-36404

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PATENTS

FILED IN PATENT OFFICE

OIPE JC82
MAR 13 2000
PATENT & TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US)

International Application No.: PCT/IB98/01516

International Filing Date: September 11, 1998

Priority Date Claimed: March 13, 2000

Title of Invention: METHOD FOR RECEIVING AND STORING OPTICALLY DETECTABLE DATA

Applicant(s) for DO/EO/US:

Applicant herewith submits to the United States Designed/Elected Office (DO/EO/US) the following items under 35 U.S.C. 371:

1. ✓ This is a **FIRST** submission of items concerning a filing under 35 U S C 371
2. ___ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U S C 371
3. ✓ This express request to immediately begin national examination procedures (35 U S C 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U S C 371(b) and PCT Articles 22 and 39(1)
4. ✓ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date
5. ✓ A copy of the International Application as filed (35 U S C 371(c)(2))
   a. ✓ is transmitted herewith (required only if not transmitted by the International Bureau)
   b. ___ has been transmitted by the International Bureau
   c. ___ is not required, as the application was filed in the United States Receiving Office(RO/US)
6. ___ A translation of the International Application into English
7. ___ Amendments to the claims of the International Application under PCT Article 19
   a. ___ are transmitted herewith (required only if not transmitted by the International Bureau)
   b. ___ have been transmitted by the International Bureau
   c. ___ have not been made, however, the time limit for making such amendments has **NOT** expired
   d. ___ have not been made and will not be made
8. ___ A translation of the amendments to the claims under PCT Article 19(35 U S C 371(c)(3))
9. ✓ An oath or declaration of the inventor(s) (35 U S C 371(c)(4))
   a. ___ is transmitted herewith (required only if not transmitted by the International Bureau)
   b. ___ has been transmitted by the International Bureau
   c. ✓ will follow
10. ___ A translation of the Annexes to the International Preliminary Examination Report under PCT Article 36 (35 U S C 371(c)(5))
11. ✓ Copy of the ✓ International Preliminary Examination Report and/or the ✓ International Search Report
12. ___ An Information Disclosure Statement under 37 CFR 1 97 and 1 98
13. ___ An Assignment document for recording with a separate cover sheet in compliance with 37 CFR 3 28 and 3 31
   a. ___ is transmitted herewith (required only if not transmitted by the International Bureau)
   b. ___ has been transmitted by the International Bureau
   c. ___ will follow.
14. ✓ A **FIRST** preliminary amendment
    ___ A **SECOND** or **SUBSEQUENT** preliminary amendment
15. ___ A substitute specification
16. ___ A change of power of attorney and/or address letter

17. ___ Verified Small Entity Declaration
    a ___ is transmitted herewith (required only if not transmitted by the International Bureau)
    b ___ has been transmitted by the International Bureau
    c ___ will follow.

18. ✓ Other items of information: Schedule A .

19. ___ sheets of drawings are enclosed

20. ✓ The U S National Fee (35 U.S.C 371(c)(1)) and other fees as follows

BASIC NATIONAL FEE (37 CFR 1 492 (a)(1)-(5)) ✓ Search Report has been prepared by the EPO or JPO = $840 ___ International preliminary examination fee paid to USPTO (37 CFR 1 482) = $700 ___ No international preliminary examination fee paid to USPTO (37 CFR 1 482) but international search fee paid to USPTO (37 CFR 1.445(a)(2)) = $760 ___ Neither international preliminary examination fee (37 CFR 1 482) nor international search fee (37 CFR 1 445(a)(2)) paid to USPTO = $970 ___ International preliminary examination fee paid to USPTO (37 CFR 1 482) and all claims satisfied provisions of PCT Article 33(2)-(4) = $96	$840
___ Surcharge of **$130** for furnishing the oath or declaration later than the __ **20** ✓ **30** months from the earliest claimed priority date (37 CFR 1 492(e))	TOTAL FEE FOR LATE FILING OF OATH/DECLARATION $
NUMBER OF INDEPENDENT CLAIMS 1- 3 = 0 CLAIMS OVER 3 X $78= RATE	TOTAL FEES FOR INDEPENDENT CLAIMS OVER 3 $
MULTIPLE DEPENDENT CLAIMS(S) PRESENT RATE $260 PER APPLN	FEE FOR MULTIPLE DEPENDENT CLAIM(S) $
TOTAL NUMBER OF CLAIMS 20- 20 = 0 CLAIMS OVER 20 X $18 = RATE	TOTAL FEES FOR CLAIMS OVER 20 $ 0
TOTAL OF ABOVE CALCULATIONS	$ 840
Reduction by 1/2 for filing by small entity	$
SUBTOTAL	$ 840
ASSIGNMENT RECORDAL SHEET	$
Processing fee of **$130** for furnishing the English translation later than the __ **20** ✓ **30** months from the earliest claimed priority date (37 CFR 1 492(f)).	$ 130
TOTAL FEES ENCLOSED	$ 970

a. ✓ A check in the amount of $ 970 00 to cover the above fees is enclosed
b. ___ Please charge my Deposit Account No 04-2219 in the amount of $_____ to cover the above fees A duplicate copy of this sheet is enclosed
c. ✓ The Commissioner is hereby authorized to charge any additional fees which may be required, including request for extension and payment of extension fees due, when this is not explicitly requested by applicants. with a view toward avoidance of abandonment, to Deposit Account No 04-2219, referencing our docket # C36404 Any over-payment should be credited to this account

Please direct all communications in connection with this application to the undersigned at

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EXPRESS MAIL CERTIFICATION

"Express" Mail label number **EL121803955US**
Date of Deposit **March 13, 2000**

I hereby certify that this transmittal letter and the papers and fees identified in this transmittal letter as being transmitted herewith are being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C F R 1 10 on the date indicated at (A) above and are addressed to the Commissioner of Patents & Trademarks, Washington, D.C 20231

Sharon Stolfa
Name of Person mailing the above

Signature of Person mailing the above item

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of)
)
Applicant: MÜLLER, Markus)
)
Serial No.: New U.S. Application)
)
PCT Application No.: PCT/IB98/01516)
)
Filed: March 13, 2000)

For: METHOD FOR RECEIVING AND STORING OPTICALLY DETECTABLE DATA
Attorney Docket No. C36404

PRELIMINARY AMENDMENT

Hon. Commissioner of
Patents and Trademarks
Box PCT
Washington, D.C. 20231

March 13, 2000

Sir:

Please amend the newly submitted patent application described above as follows:

In the Claims:

Please amend the claims as follows:

Claim 4, line 1, delete "2 oder 3,".

Claim 5, line 1, delete "einem der vorhergehenden Ansprüche" and insert --Anspruch 1--.

Claim 7, line 1, delete "einem der vorhergehenden Ansprüche" and insert -- Anspruch 1--.

Claim 8, line 1, delete "einem der vorhergehenden Ansprüche" and insert -- Anspruch 1--.

Claim 9, line 1, delete "einem der vorhergehenden Ansprüche" and insert -- Anspruch 1--.

Claim 10, line 1, delete "einem der vorhergehenden Ansprüche" and insert -- Anspruch 1--.

Claim 11, line 1, delete "einem der vorhergehenden Ansprüche" and insert -- Anspruch 1--.

Claim 12, line 1, delete "einem der vorhergehenden Ansprüche" and insert -- Anspruch 1--.

Claim 13, line 1, delete "einem der vorhergehenden Ansprüche" and insert -- Anspruch 1--.

Claim 14, line 1, delete "einem der vorhergehenden Ansprüche" and insert -- Anspruch 1--.

Claim 15, line 1, delete "einem der vorhergehenden Ansprüche" and insert -- Anspruch 1--.

Claim 17, line 1, delete "oder 16".

Claim 18, line 1, delete "einem der Ansprüche 15 bis 17" and insert --Anspruch 15--.

Claim 19, line 1, delete "einem er Ansprüche 15 bis 18" and insert -- Anspruch 15--.

Claim 20, line 1, delete "einem der Ansprüche 1 bis 18" and insert Anspruch 1--.

REMARKS

The foregoing amendments are primarily for the purpose of eliminating multiple dependencies, and placing the claims in proper form.

Respectfully submitted,

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KHO/ss

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of)
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Applicant: MÜLLER, Markus)
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Serial No.: 09/508847)
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PCT Application No.: PCT/IB98/01516)
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Filed: March 13, 2000)

For: METHOD FOR RECEIVING AND STORING OPTICALLY DETECTABLE DATA
Attorney Docket No. C36404

PRELIMINARY AMENDMENT

Hon. Commissioner of
Patents and Trademarks
Washington, D.C. 20231

May 23, 2000

Sir:

Please amend the newly submitted patent application described above as follows:

In the Claims:

Please amend the claims as follows:

Claim 4, line 1, delete "2 or 3".

Claim 5, line 1, delete "one of the foregoing claims" and insert --claim 1--.

Claim 7, line 1, delete "one of the foregoing claims" and insert --claim 1--.

Claim 8, line 1, delete "one of the foregoing claims" and insert --claim 1--.

Claim 9, line 1, delete "one of the foregoing claims" and insert --claim 1--.

Claim 10, line 1, delete "one of the foregoing claims" and insert --claim 1--.

Claim 11, line 1, delete "one of the foregoing claims" and insert --claim 1--.

Claim 12, line 1, delete "one of the foregoing claims" and insert --claim 1--.

Claim 13, line 1, delete "one of the foregoing claims" and insert --claim 1--.

Claim 14, line 1, delete "one of the foregoing claims" and insert --claim 1--.

Claim 15, line 1, delete "one of the foregoing claims" and insert --claim 1--.

Claim 17, line 1, delete "or 16".

Claim 18, line 1, delete "one of the claims 15 to 17" and insert --claim 15--.

Claim 19, line 1, delete "one of the claims 15 to 18" and insert --claim 15--.

Claim 20, line 1, delete "one of the claims 1 to 18" and insert --claim 1--.

REMARKS:

The foregoing amendments are primarily for the purpose of eliminating multiple dependencies, and placing the claims in proper form.

Respectfully submitted,

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Method for Receiving and Storing Optically Detectable Data

The present invention relates to a method for recording and storing optically detectable data of an object on a storage medium, as defined generically in Patent Claim 1.

Methods of this kind are used in various wavelength ranges, for example, in the domain of infrared or ultraviolet radiation, of visible light, or of thermal radiation. Appropriate cameras and the associated optics are used, depending on the wavelength range. The object of interest is either recorded as a whole or in separate sections. Each of the individual recordings is of a specific size. Because of the settings of the optical components of the camera, and of the spatial distance between the object and the camera, the recording will incorporate areas that are sharply focused or not so sharply focused. A recording that is sharp in all of its areas cannot be achieved, for only those parts of the object that lie within the focus of the optical system that is used will be clearly focused. The focus is spatially limited and is, in most instances, smaller than the object. Furthermore, if the object is three-dimensional, not all areas of the surface or of the layers that lie immediately beneath the surface can be sharply imaged with the aid of one recording. In addition, it is a further disadvantage that the diaphragm of the camera cannot be opened wide, so that brilliance of the recording is less, since a

widely opened diaphragm reduces the depth of focus, with the result that only a correspondingly small part of the object can be sharply imaged.

The prior art (DE 39 31 934 C2, DE 39 05 619 A1) describes an image input and output device that incorporates a focusing system. Using this focusing system, the optical components of the image input device are adjusted sharply to a plurality of different object planes. In order to record image information, a plurality of images of one object are recorded using various settings of the optical components, and the information obtained by doing this is combined. Digital methods are used in order to do this. Using this known device, it is a disadvantage that the variable adjustment of the optical components requires a mechanism that moves the optical components with a very high degree of precision. Such a mechanism is costly to manufacture, and is vulnerable to damage, wear, and other impairments when it is used. In addition, because of the various optical settings that are used, the information can be assembled only at great cost, since the scale of the images changes for each recording because of the changes to the optical components.

In contrast to the foregoing, the method according to the present invention, which is use for recording and storing optically detectable data of an object entails the advantage that, using

one camera, a sequence of a plurality of individual recordings of the object is made using different spatial settings with respect to the position between the object and the camera. The setting used for the optical components, and the resulting focus, remain unchanged when this is done. Because of this, the method is simpler to use than the methods already known from the prior art. A mechanism for effecting precise changes to the optical components is rendered unnecessary. Because of this, application of this method is more cost-effective than previously known methods and it is less vulnerable to impairments, disruptions, or wear when it is used.

The sharply imaged areas of the individual recordings are determined and are assembled, and a plurality of resulting images are formed therefrom. Since the optical components remain unchanged during the different individual recordings, the scale does not change. This leads to the fact that when the individual recordings are being assembled, there is no need to match these with respect to scale. Thus, assembly of the information is less costly than in the case of the known methods.

This method can be used both to record individual images of objects as well as to record films. The method can be used

manually by cutting out and pasting the sharply focused areas or this can be done by means of screening. However, this method can also be used with the aid of a computer. In the case of two dimensional objects, or in the case of objects of which a two-dimensional resulting image will suffice, it can be sufficient to assemble the sharp areas to form one single resulting image. In the case of three-dimensional objects, the sharp areas of different planes of the object can be assembled to form one or a plurality of resulting images. The latter case entails the advantage that various features will be shown in different resulting images. Because of this, it becomes simpler to process the images, in particular with respect to recognizing the features. It is also possible to assemble different resulting images for the different depths of penetration into the object that are achieved with the radiation that is used. More advantageously, the individual recordings can be made with the camera lens at larger diaphragm apertures. When this is done, sharp resulting images will be obtained, despite the large diaphragm apertures. This increases the light sensitivity of the recordings. The camera does not have to be sharply focused for each individual recording, since the sharp images are selected electronically, and stored, and images that are not sharp are not stored. Even if the object moves during the recording process,

the resulting image will be sharp. The number of individual recordings that are made for each object will depend on the particular application. As a rule, about twenty individual recordings is sufficient. However, in certain cases it may be many more, for example, more than 100 individual recordings, or it may be fewer, for example, five individual recordings. Exposure times will be selected depending on the object and the camera that is used. It depends on the number of individual recordings that a desired per second or per minute. Many types of cameras, for example, CCD cameras, make it possible to reduce the exposure time electronically.

The objects that are recorded can be machines, structural elements, works of art, jewellry, or other valuable items, or they can be individuals or animals. Biometric or anatomical features are used in order to recognise or identify persons or animals, in particular breeding animals, and these are recorded in the individual images. Both intentional as well as unintentional movements of the object can be used in order to obtain information. Parallel shifts or rotations that are perpendicular to the optical axis are used in order to achieve greater resolution from the camera. Higher resolution can also be achieved by computation. Parallel shifts of the object

perpendicular to the optical axis can be evaluated in order to obtain stereoscopic or three-dimensional resulting images even if only one camera is used to record a sequence of individual recordings. When this is done, one exploits the fact that specific areas of the object that has been recorded can be imaged in sequences of individual recordings as their sharpness changes continuously. In this way, it is also possible to obtain information regarding the topography and the surface configuration of an object.

Using a sequence of a plurality of recordings made at pre-set intervals of time, it is also possible to identify dynamic processes of the object. Thus, this method permits the examination of the object over time. This means that movement of an object can be followed and recorded. This recorded movement can be used, for example, to disclose or identify the object or to control specific processes. For example, faulty elements in a production process can be revealed, or an individual can be identified. Intentional movements made by an individual can also supply additional information.

The restricted depth of focus can be used in order to identify, image, and evaluate features beneath the surface of the object.

The method according to the present invention permits the use of a large diaphragm aperture. This makes it possible to obtain an image with the specific degree of sharpness.

According to one preferred embodiment of the present invention, the individual recordings are stored in a computer and the sharply imaged areas of the individual recordings are determined by the computer, using digital methods. The resulting images are assembled with the aid of the computer. Specific and suitable software is used for this purpose. This software also determines the limits of the sharply imaged areas. When the resulting image is being assembled, it is also possible to use knowledge of the Trelly method that is known from information theory and signal processing methods. As an example, the individual recordings are stored in RAM or or on the hard disk of the computer. The sequence of individual recordings will only be required until such time as the resulting images is generated. Once this has been done, the sequence of individual recordings is erased.

It is possible to use different methods in order to generate a resulting image. Using a first method, n individual images are filtered with a high pass filter and a sharp areas are copied.

When this is done, the transition frequency of the filter is matched to the ranges of sharp focus. This filter can also be made up of a number of different filters. In order to do this, it is possible to use digital methods such as Fourier transformations, wavelet transformations, digital filters, differential or difference formation, as well as Bessel, Butterworth, or Gauss filters. It is also possible to evaluate other information in addition to the sharply imaged areas of the individual images; examples of this are the enlargement or reduction of the imaging relative to the plane of focus in the areas on both sides of the play the focus. Assembly of the sharply imaged areas of the individual images is effected, for example, with the aid of known digital processes. One or more resulting images will be assembled, depending on the shape of the object and its surface configuration, as well as the number of strata depths or the types of features that are of interest.

In a second method, as compared to the first method, the topology or morphology of the characteristic features of the object are also taken into consideration. As an example, if the object to be recorded is a finger then, using this method, different principle layers and glands as well as, for example, the papillary layer and sweat and sebaceous glands can be evaluated.

When this is done, it is possible to take into account the fact that the papillary lines are largely joined and are on the surface.

In a third method, three-dimensional resulting images are generated from the sequence of individual recordings with the aid of digital functions. Subsequently, such an image can be rotated, tilted, inclined, or moved in any other way, so that the user can see various views of the object on the display screen. This method is particularly suitable in those instances when the data recorded using the method according to the present invention is to be recognized in a data set that is recorded subsequently. Any rotation or shifting of the object in the first data set relative to the second data set can be corrected and compensated for, so that recognition is nonetheless possible.

According to another advantageous version of the present invention, the sharply imaged areas are determined by way of numerical images of the derivative. The derivative is to be formed in both dimensions of the two-dimensional individual recordings. The derivative is maximal or minimal at the sharply imaged locations. The sharply imaged areas can also be obtained when suitable filters are used, by comparing them with images

recorded using different filters.

In another advantageous version of the present invention, the parameters for recording the sequence of individual recordings is predetermined by a computer and the recording sequence is controlled by this same computer.

According to another advantageous version of the present invention, recording the sequence of individual recordings is started automatically. Thus, for example, recording can be started at a specific time or when the object is in a specific position. Recording can also be started when the computer that is processing the individual recordings identifies sharply imaged areas.

In another advantageous version of the present invention, recording the sequence of individual recordings is started by a photoelectric barrier. This method is particularly suitable if the object moves towards and away from the camera during the recording process. The recording is then started automatically if the object approaches to within a specific distance from the camera.

According to another advantageous version of the present invention, the individual recordings are made at precisely fixed intervals of time. Thus, the camera can take twenty-five individual recordings as images or fifty individual recordings as half images each second, and these are then transferred to the computer memory. These values apply in the case of a CCIR standard. Other values will apply in the case of other standards. Not all of the individual recordings have to be stored in memory. The time for beginning a recording and the time at which storage begins in the computer memory can be different. The underlying principle in this case is that recording the sequence of individual recordings and their storage in the computer memory are processes that are not linked to each other.

According to another advantageous version of the present invention, the individual recordings are made at fixed relative distances between the camera and the object. This can be done, for example, by appropriately arranged photoelectric barriers.

In another advantageous version of the present invention, a CCD camera is used to record the sequence of individual recordings. A line camera or a scanner can also be used in place of the CCD camera.

According to another advantageous version of the present invention, initially all the individual recordings of the sequence are stored in the computer. Once the sequence has been recorded, the sharply imaged areas of the individual recordings are identified and assembled to form a resulting image.

In a further advantageous configuration of the present invention, the sharp areas of each individual recording of the sequence are identified immediately after they have been recorded, and then incorporated into the resulting image. The individual recordings are not stored. Providing the CPU of the computer is operating fast enough, identification of the sharp areas and their incorporation into the resulting image can take place in real time. If this is not the case, then the data relevant to the individual recordings must be placed in intermediate storage. If a plurality of resulting images are generated from the individual recordings, the assembly of the individual resulting images can be effected using different methods. In order to further speed up the recording of the data and storage in the computer, a plurality of processors can be used for assembling one or more resulting images. The interaction of the processors can be organised from different standpoints. On the one hand, the

digital computations involved in Methods 1 to 3 described above can be divided into as many sections as can run concurrently. Each section will be processed by a different processing. The processors are synchronised by input, output, or by the end of the process for each section. The data are passed on, or a RAM with more than one access is used (multiported RAM). The assembly of a plurality of resulting images can be effected in part in parallel. Thus, all the resulting images can be formed, even as an object is approaching the camera. To the extent that this is not possible, the missing resulting images will be computed subsequently. This will result in grid patterns with all the information that has been read out or computed.

According to another advantageous version of the present invention, a plurality of resulting images will be assembled from the sequence of individual recordings, with a different area of the object being shown in the resulting images in each instance.

According to another advantageous configuration of the present invention, the plane of the image is divided into a plurality of areas, and these areas are then processed in parallel. This method is particularly suitable if a plurality of processors is available for processing. The areas involved can be squares,

rectangles, circles, ovals, or other shapes. These can be adjacent to each other or can overlap each other.

According to another advantageous version of the present invention, the method is used up to identify the features of a finger, in particular, of a fingertip. In order to record the data, the finger it is brought close to a camera. The process for recording the sequence of individual recordings is started during this approach. Still more individual recordings can be made as the finger is moving away from a camera. For purposes of recognition, particularly characteristic features at the fingertips are identified from the resulting image and are looked for during a repeated recording of the finger. The sweat and sebaceous glands as well as the papillary layer, as well as the openings of the glands on the surface of the skin, which form the dermis and the epidermis, are particularly characteristic features of a finger tip. The papilla are also the basis for the behaviour of the skin. The papillary layer, the sweat and sebaceous glands, as well as the openings of the glands on the surface of the skin can be recorded in different resulting images. This simplifies recognition. Using the method according to the present invention, it can also be determined as to whether or not blood is flowing through the finger. If the finger is

illuminated with a source of infra-red light, a sequence of individual recordings can be made to show variations of brightness as a function of the individual's heartbeat. Furthermore, as blood flows through the fingers, this causes a periodic shift of the cells in the blood vessels within the finger, and this can also be identified with the aid of the method according to the present invention.

According to another advantageous version of the present invention, the object is illuminated with a light source.

According to another advantageous version of the present invention, a pulsed light source is used, and this is synchronised with the camera. The object is only illuminated when an individual recording is to be made.

According to another advantageous configuration of the present invention, the object is illuminated by a plurality of light sources of different wavelength ranges and in different arrangements. Different types of illumination can be used. Because of the different spatial arrangements, the light will arrive at different angles of incidence. In this way, different spatial, geometric or perspective individual recordings can be

made. As an example, flash tubes with different optical filters can be used as the light sources.

Because of the filters, electromagnetic radiation in various wavelength ranges is obtained with the aid of one light source.

According to another advantageous version of the present invention, the objective is illuminated only whilst it is moving toward and away from the camera. The individual recordings are made during this interval of time. In this way, one obtains individual recordings made at different distances from the camera, which are thus of various depths of focus.

According to another advantageous version of the present invention, only those areas of the object that are within focus of the camera are illuminated. This is made possible in that the focus of the camera is not changed between the recording of the individual images. The evaluation and assembly of the individual recordings is simplified in that there is no information from the unsharp areas in the individual recordings.

It is advantageous that a system that incorporates a computer, a camera, and a control device is used it to carry out the method

according to the present invention.

Additional advantages and advantageous configurations of the present invention are set out in the Patent Claims.

According to the present invention, all of the features that are set out in the description and in the claims can be used either singly or in any combination with each other, as essential to the present invention.

Patent Claims

1. Method for recording and storing the optically detectable data of object on a storage medium, characterized in that a sequence of a plurality of individual recordings of the object are made with a camera at various spatial settings with respect to the relative position between the object and the camera; in that the sharply imaged areas of the individual recordings are determined; and in that the sharply imaged areas of all the individual recordings are assembled to form one or a plurality of resulting images.

2. Method as defined in Claim 1, characterized in that the individual recordings are stored in a computer; in that the sharply imaged areas of the individual recordings are determined by the computer with the aid of digital methods; and in that the resulting images are assembled with the aid of the computer.

3. Method as defined in Claim 2, characterized in that the sharply imaged areas are determined by digital formation of the derivative.

4. Method as defined in Claim 1, Claim 2, or Claim 3, characterized in that the parameters for recording the

sequence of individual recordings are predetermined by a computer; and in that the sequence of the recording is controlled by this computer.

5. Method as defined in one of the preceding Claims, characterized in that the recording of the sequence of individual recordings is started automatically.

6. Method as defined in Claim 5, characterized in that the recording of the sequence of individual recordings is started by means of a photoelectric barrier.

7. Method as defined in one of the preceding Claims, characterized in that the individual recordings are made at fixed, predetermined time intervals.

8. Method as defined in one of the preceding Claims, characterized in that the individual recordings are made at fixed, predetermined relative distances between the camera and the object.

9. Method as defined in one of the preceding Claims, characterized in that a CCD camera is used as the camera for recording the sequence of individual recordings.

10. Method as defined in one of the preceding Claims, characterized in that initially all the individual recordings of the sequence are stored in the computer; and in that the sharply imaged areas are identified after recording of the sequence of individual recordings has been concluded.

11. Method as defined in one of preceding Claims, characterized in that the sharply imaged areas of each individual recording of the sequence are identified and incorporated into the resulting image immediately after they have been recorded.

12. Method as defined in one of the preceding Claims, characterized in that a plurality of resulting images is assembled from the sequence of individual recordings, different areas of the object or different features of the object being shown in the resulting images in each instance.

13. Method is defined in one of the preceding Claims, characterized in that the image plane is divided into a plurality of areas; and in that the areas are processed in parallel.

14. Method as defined in one of preceding Claims, characterized in that it is used to identify the features of a finger.

15. Method as defined in one of preceding Claims, characterized in that the object is illuminated with a light source.

16. Method as defined in Claim 5, characterized in that a pulsed light source that is synchronized with the camera is used.

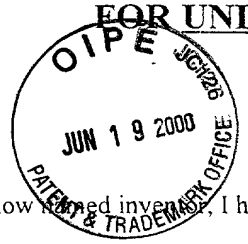
17. Method as defined in Claim 15 or 16, characterized in that the object is illuminated by a plurality of light sources of different wavelength ranges and in different arrangements.

18. Method as defined in one of the Claims 15 to 17, characterized in that the object is illuminated as long as it is moving towards the camera and away from the camera.

19. Method as defined in one of the Claims 15 to 18, characterized in that only the areas of the object that are within the focus of the camera are illuminated.

20. Apparatus for carrying out a method according to one of the Claims 1 to 18, characterized in that a computer, a camera, and a control device are provided.

DECLARATION OF INVENTORSHIP AND POWER OF ATTORNEY FOR UNITED STATES PATENT OR DESIGN APPLICATION



COPY

Attorney Docket No. C36404

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

MEHTHOD FOR RECEIVING AND STORING OPTICALLY DETECTABLE DATA

the specification of which

(check one) {} is attached hereto.

{} was previously filed. U.S. serial number not yet available to applicant. A copy of the specification as filed is attached for identification purposes

{} was filed on _____ Attorney Docket No. _____

{✓} was filed on March 13, 2000 Under Application Serial No. 09/508847

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the Office all information which is material to Patentability as defined in 37 CFR § 1.56.

I hereby claim the benefits under 35 USC § 119(e) of any United States application(s) listed below, or 35 USC § 172 of any foreign application(s) listed below.

Prior US Provisional or Foreign Application(s):

APPLICATION NUMBER	COUNTRY	FILING DATE (Day/Month/Year)

I hereby claim the benefit under 35 USC § 120 of any United States application(s) listed below, and any prior filed International application under 35 USC § 365 listed below, and sofar as the subject matter of each of the claims of this application is not disclosed in the prior application. I acknowledge the duty to disclose to the Office information which is material to patentability as defined in 37 CFR § 1.56 which became available between the filing date of the prior application and the filing date of this application.

APPLICATION NUMBER	FILING DATE (Day/Month/Year)	STATUS (Patented, Pending, Abandoned)
PCT/IB98/01516	11 September 1998	Pending

I hereby appoint the following attorney(s) and/or agents to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith: KEITH H. ORUM (33985), SUSAN M. KEATING (41887), ANDREW D. BABCOCK (44517), GEORGE F. DVORAK (17656).

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I hereby declare that all statements made herin of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willfull false statements and the like so made are punishable by fine or imprisonment, or both, under 18 USC 1001, and that such willful false statements may jeopardize the validity of the application or any patent issuing theron.

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